# (12) UK Patent Application (19) GB (11) 2 331 491 (13) A

(43) Date of A Publication **26.05.1999**

(21) Application No **9723614.5**

(22) Date of Filing **07.11.1997**

(71) Applicant(s)
**Autoliv Development AB**
**(Incorporated in Sweden)**
**Patent Department, S-447 83 Vargarda, Sweden**

(72) Inventor(s)
**Jan Valkenburg**

(74) Agent and/or Address for Service
**Forrester Ketley & Co**
**Forrester House, 52 Bounds Green Road, LONDON, N11 2EY, United Kingdom**

(51) INT CL$^6$
**B60R 21/20 // B60R 21/22**

(52) UK CL (Edition Q)
**B7B BSBCM BSBCR B601**

(56) Documents Cited
**GB 2291014 A** **EP 0792773 A1** **EP 0722862 A1**
**US 5669627 A** **US 5531471 A** **US 5520410 A**

(58) Field of Search
UK CL (Edition P) **B7B BSBCR**
INT CL$^6$ **B60R 21/20 21/22**
**Online: WPI**

(54) Abstract Title
**Elongate airbag housing**

(57) An airbag arrangement incorporates an elongate extruded plastics housing 1 of uniform cross-section defining an airbag 2 receiving chamber closed by a snap fastener. Arrangements include: the snap fastener comprising a bifurcated socket 6 on the bottom 4 of the back wall of the housing engaged by a bead 7 on another 8, the socket and bead pulling apart on inflation of the airbag; the clip comprising one or more separate clips (33 Fig. 3) having a line of weakness (35) that ruptures on inflation; a socket and bead snap fastening (46, 47 Fig. 4) on an upper horizontal wall (45) and a rupturable line of weakness (51) at a horizontal lower wall. The elongate housing may be bent by means of cut-outs 13. The airbag has integral tabs (15 Fig. 2) protruding from the back wall with apertures 16 alignable with mounting holes 11.

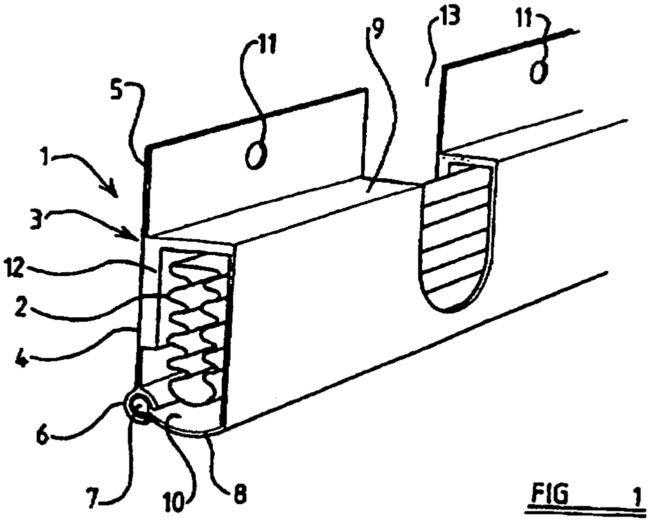

FIG 1

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## DESCRIPTION OF INVENTION

## "IMPROVEMENTS IN OR RELATING TO AN AIR-BAG ARRANGEMENT"

**THE PRESENT INVENTION** relates to a housing for an air-bag and relates to a combination of a housing and an air-bag.

It has been proposed to provide air-bags at various positions within motor vehicles, the air-bags being adapted to inflate in the event that an accident should occur, to provide protection for the driver of the vehicle or other occupant of the vehicle.

In particular, it has been proposed to provide air-bags which, before inflation, extend across the top of the door opening in a motor vehicle and at least part way down the "A"-Post. Such air-bags may be termed "side-curtain" air-bags and, typically, when such an air-bag is inflated it forms a substantially rigid structure extending along the side of the vehicle between the occupant of the vehicle and the windows present in the door or doors of the vehicle. Such a "side-curtain" may serve to prevent the head of the occupant of the vehicle from tilting the side of the vehicle or being thrown out through the window opening in the event of a side impact or in the event of a roll-over.

It is most convenient to be able to pack an air-bag in a housing, and then install the housing, complete with the air-bag within it, into a motor vehicle. If an air-bag is to be mounted in position in a channel or recess the air-bag within it, into a motor vehicle. If an air-bag is to be mounted in position in a channel or recess extending over the door opening of a vehicle and part way down the "A"-Post, the air-bag should be contained in an elongate housing that can be fitted in position in an unobtrusive manner. The present invention seeks to provide a housing of this type.

According to this invention there is provided a housing for an air-bag, the housing being of elongate form and being of substantially uniform cross-section, parts of the housing defining a chamber adapted to receive an air-bag, the said parts of the housing being inter-connected by a snap-fastening joint.

Preferably the housing comprises an extending wall portion provided with apertures to facilitate the fixing of the housing in position.

Conveniently the housing is formed as an extrusion of an appropriate plastics material.

Advantageously the snap-fastening joint comprises a socket and a bead adapted to be snapped into the socket.

Alternatively the snap-fastening comprises means defining two adjacent lips and clip means adapted to be engaged with the lips with a snap action to secure the lips adjacent one another.

Conveniently the said clip means are provided with a line of mechanical weakness to facilitate the rupturing of the clip means.

Advantageously the housing is provided with a plurality of spaced-apart cut-outs, a substantial proportion of the material forming the housing being removed in the region of each cut-out.

Advantageously each cut-out is so configured that the snap-fastening joint is unbroken over the entire length of the housing.

Preferably the part of the housing defining the chamber defines a line of mechanical weakness adapted to rupture on inflation of an air-bag contained with the housing.

Conveniently the housing defines a rear wall, which rear wall carries means adapted to fix the housing in position, and part of the chamber defined by the housing comprises a horizontal upper wall extending from the rear wall, at least part of the rear wall and at least part of the horizontally extending upper wall which together bound the chamber being formed of relatively thick, and thus relatively strong, material.

Advantageously the housing may be provided in combination with an air-bag contained within the chamber defined by the housing.

Preferably the air-bag is provided with a plurality of apertured lugs, the apertured lugs passing through slots communicating with the chamber, and being aligned with apertures defined by the housing to accept mounting means for mounting the combination in position.

In order that the invention may be more readily understood, and so that various features thereof may be appreciated, the invention will now be described, by way of example, with reference to the accompanying drawings in which:

FIGURE 1 is a part sectional view of one form of air-bag housing in accordance with the invention, illustrating, schematically, an air-bag within the housing,

FIGURE 2 is a rear view of the housing shown in Figure 1,

FIGURE 3 is an exploded view showing an alternative form of housing in accordance with the invention, without an air-bag being present, and

FIGURE 4 is a further diagrammatic view of yet another embodiment of the invention.

Referring initially to Figure 1 of the accompanying drawings, a housing 1 is provided adapted to contain an air-bag 2. The housing 1 is of elongate form and is produced from an extrusion of an appropriate plastics material.

The housing defines a substantially vertically positioned rear wall 3. The rear wall 3 has a lower part 4 and an upper part 5.

The lower part 4 of the rear wall 3 terminates, at its lower end, with a bifurcation which forms a socket 6. Received as a snap-fit within the socket 6 is a bead 7 carried on a wall portion 8. The wall portion 8 depends from a forwardly extending horizontal wall 9 which extends forwardly from the rear wall 3 at the junction between the lower part 4 of the rear wall 3 and the upper part 5 of the rear wall 3. The lower part 4 of the rear wall 3, the wall

8 and the horizontal wall 9 surround a hollow chamber 10. The hollow chamber 10 contains the air-bag 2.

It is to be noted that the upper part 5 of the rear wall 3 is provided with a plurality of fixing apertures 11 to enable the housing to be fixed in position.

It is also to be observed that at least the upper region of the lower part 4 of the rear wall 3, and at least the region of the horizontal wall 9 that extends forwardly from the rear wall 3 are made substantially thicker, and thus stronger, than the remaining walls, as illustrated at 12.

Spaced evenly along the length of the housing 1 a plurality of cut-outs 13 are provided. Each cut-out comprises a region where the material forming the upper part 5 of the rear wall 3, the horizontal wall 9, and a substantial proportion of both the wall 8 and the lower part 4 of the rear wall 3 have been removed. The only material remaining is the material forming part of the lower wall 8, and the lowest-most part of the rear wall 4, together with the socket 6 and the bead 7.

Referring to Figure 2, the rear wall 3 of the housing is provided, adjacent each of the apertures 11, with a slot 14 that communicates with the chamber 10 accommodating the air-bag 2. A substantially triangular tab 15, which defines an aperture 16, which is formed integrally with the air-bag 2 passes out through each slot 14. The aperture 16 in each tab is aligned with the aperture 11 formed in the upper part 5 of the rear wall 3.

The combination of the socket 6 and the bead 7 form a snap-fastening which can be used to facilitate the insertion of the folded air-bag into the chamber 10.

Initially the snap-fastening will be in the open condition, with the bead 7 separated from the socket 6. The air-bag may then be easily located within the chamber 10. The bead 7 may then be urged into the socket 6, thus easily closing the chamber.

The housing, together with the air-bag, may then be mounted in position in a motor vehicle. Bolts or other fastening means will be utilised, the bolts passing through the aligned apertures 11 and 16 to be connected to anchoring points provided in the motor vehicle.

If the housing 1 has to adopt a non-linear form, the housing may be bent so that it has an appropriate configuration. The presence of the cut-outs 13 facilitates this bending, and helps ensure that when the housing has been bent, the bead 7 does not tend to become dislodged from the socket 6. Thus the bead 7 is securely retained within the socket 6 over the entire length of the housing. This serves to facilitate an opening of the housing when the air-bag is inflated.

Inflation of the air-bag will cause one end of the bead 7 to become disengaged from the socket 6. Continuing inflation of the air-bag will cause the bead 7 to gradually peel out of the socket 6 over the entire length of the housing. The air-bag may thus inflate in a uniform manner. If the cut-outs interrupted the connection between the bead 7 and the socket 6, not only would it be more difficult to close the snap-fastening constituted by the bead 7 and the socket 6 over the entire length of the housing during fabrication and assembly of the housing-and-air-bag combination, but also, during inflation of the air-bag, problems might well arise. During the initial stage of inflation an initial section of the bead 7 would be removed from the socket 6. However, when a gap in the bead and socket was encountered, the air-bag would continue to inflate until sufficient pressure was present within the air-bag to cause the next section of the bead-and-socket snap-fastening to begin to disengage. The pressure in the air-bag would then reduce. This would lead to a very undesirable inflation characteristic.

The relatively stiff parts 12 of the upper region of the lower part 4 of the rear wall 3, and at least that part of the horizontally extending wall 9 that is secured to the rear wall 3, form a substantially rigid support which will aid in supporting the air-bag 2 in the desired position when the air-bag 2 is inflated.

Figure 3 illustrates a modified embodiment of the invention in which a housing 21 is provided, a substantial proportion of the housing having the same effective configuration as the housing 1 illustrated in Figure 1. The housing 21 is provided with a rear wall 22 having a lower region 23 and an upper region 24. The lower region 23 carries a forwardly projection portion 25, which terminates in a depending lip 26. The lip 26 is located adjacent a corresponding depending lip 27 carried by an adjacent wall portion 28, the wall portion 28 effectively being carried by a forwardly extending horizontal upper wall 29 which extends forwardly from the rear wall 22 at the junction between the lower portion 23 and the upper portion 24 thereof. The lower portion 23 of the rear wall, the forwardly extending projection 25, the wall portion 28 and the horizontal wall 29 together define a chamber or cavity 30 adapted to contain an air-bag.

The upper portion 24 of the rear wall 22 has a fixing aperture 31 and a plurality of cut-outs 32, which correspond to the cut-outs 13, may be provided, spaced along the length of the housing.

Clip means 33 are provided which connect together the lips 26 and 27. The clip means 33 may comprise one elongate clip or, alternatively, may comprise a plurality of relatively short clips. The clip is of substantially annulus form, with a small cut-out 34. The clip may be mounted over the lips 26,27 with a snap action. Part of the annulars forming the clip 33 is substantially cut away to form a line of mechanical weakness 35. Thus, although the clip may be mounted on the lips 26,27 with a snap action, the clip may be ruptured by breaking the line of mechanical weakness.

It is to be appreciated that an air-bag may be inserted in the chamber 30 defined by the housing 21 illustrated in Figure 3, and the clip means 33 may then be located in position with a snap action on the adjacent lips 26 and 27. The housing 21, together with the air-bag, may then be mounted in position in a motor vehicle. The housing may adopt a non-linear condition, with any necessary bending of the housing 21 being facilitated by the presence of the cut-outs 32. On inflation of the air-bag, pressure generated within the housing will tend to cause the clip means 33 to rupture along the line of mechanical weakness 35, thus permitting the air-bag to emerge from the chamber 30 to become fully inflated.

The upper region of the lower part 23 of the rear wall 22, and the upper horizontal extending wall 29 are made of a material which is somewhat thicker, and therefore somewhat stronger than the material forming the rest of the housing 20, thus ensuring that these regions can provide adequate support for the air-bag when the air-bag is inflated.

Figure 4 illustrates a further embodiment of the invention. Referring to Figure 4, a housing 40 comprises a rear wall 41 having a lower region 42 and an upper region 43. The upper region 43 is provided with an aperture 44 to facilitate the mounting of the housing in position.

A wall portion 45 extends horizontally forwardly from the rear wall 41 at the junction between the lower portion 42 and the upper portion 43. The wall 45 terminates with a socket 46 which receives a bead 47, the bead 47 being formed on a further horizontally extending wall portion 48. The horizontally extending wall portion 48 terminates and carries a depending front wall 49. Extending between the lower part of the front wall 49 and the lower-most part of the rear wall 41 is a horizontal lower wall 50. The horizontal lower wall 50 is provided with a substantially centrally positioned line of mechanical weakness 51. The lower part 42 of the rear wall, the horizontal wall 45 and 48, the front wall 49 and the lower wall 50 together surround a chamber 52 adapted to contain an air-bag or the like. The housing may be provided with a plurality of cut-outs 53 which correspond with the cut-outs 13.

Initially the bead 47 will be separated from the socket 46 facilitating the insertion of an air-bag into the chamber 52. Following insertion of the air-bag in the chamber 52, the bead 47 will be snap-fastened into the socket 46. Each individual length of bead 47 between adjacent cut-outs 53 will have to be snap-fastened into the corresponding socket 46.

The housing may then be positioned in a motor vehicle. If the housing has to adopt a non-linear condition, this will be facilitated by the presence of the cut-outs 53.

In the event that the air-bag is inflated, the lower wall 50 of the chamber 52 will break along the line of mechanical weakness 51, thus enabling the air-bag to emerge from the chamber 52 to be fully inflated.

In each of the embodiments described above, the basic housing may be formed as an extrusion of an appropriate plastics material.

CLAIMS:

1. A housing for an air-bag, the housing being of elongate form and being of substantially uniform cross-section, parts of the housing defining a chamber adapted to receive an air-bag, the said parts of the housing being inter-connected by a snap-fastening joint.

2. A housing according to Claim 1 comprising an extending wall portion provided with apertures to facilitate the fixing of the housing in position.

3. A housing according to Claim 1 or Claim 2 wherein the housing is formed as an extrusion of an appropriate plastics material.

4. A housing according to any one of Claims 1 to 3 wherein the snap-fastening joint comprises a socket and a bead adapted to be snapped into the socket.

5. A housing according to any one of Claims 1 to 3 wherein the snap-fastening comprises means defining two adjacent lips and clip means adapted to be engaged with the lips with a snap action to secure the lips adjacent one another.

6. A housing according to Claim 5 wherein the said clip means are provided with a line of mechanical weakness to facilitate the rupturing of the clip means.

7. A housing according to any one of the preceding Claims wherein the housing is provided with a plurality of spaced-apart cut-outs, a substantial proportion of the

material forming the housing being removed in the region of each cut-out.

8. A housing according to Claim 7 wherein each cut-out is so configured that the snap-fastening joint is unbroken over the entire length of the housing.

9. A housing according to any one of Claims 1 to 7 wherein the part of the housing defining the chamber defines a line of mechanical weakness adapted to rupture on inflation of an air-bag contained with the housing.

10. A housing according to any one of the preceding Claims wherein the housing defines a rear wall, which rear wall carries means adapted to fix the housing in position, and part of the chamber defined by the housing comprises a horizontal upper wall extending from the rear wall, at least part of the rear wall and at least part of the horizontally extending upper wall which together bound the chamber being formed of relatively thick, and thus relatively strong, material.

11. A housing according to any one of the preceding Claims in combination with an air-bag contained within the chamber defined by the housing.

12. A combination according to Claim 11 wherein the air-bag is provided with a plurality of apertured lugs, the apertured lugs passing through slots communicating with the chamber, and being aligned with apertures defined by the housing to accept mounting means for mounting the combination in position.

13. A housing for an air-bag substantially as herein described with reference to and as shown in Figures 1 and 2

of the accompanying drawings.

14. A housing for an air-bag substantially as herein described with reference to and as shown in Figure 3 of the accompanying drawings.

15. A housing for an air-bag substantially as herein described with reference to and as shown in Figure 4 of the accompanying drawings.

16. A housing according to any one of Claims 13 to 15 in combination with an air-bag contained within the housing.

17. Any novel feature or combination of features disclosed herein.

The Patent Office

**Application No:** GB 9723614.5
**Claims searched:** 1-16

**Examiner:** J.C. Barnes-Paddock
**Date of search:** 19 March 1998

# Patents Act 1977
# Search Report under Section 17

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:
UK Cl (Ed.P): B7B (BSBCR)
Int Cl (Ed.6): B60R 21/20, 22
Other: Online: WPI

**Documents considered to be relevant:**

| Category | Identity of document and relevant passage | | Relevant to claims |
|---|---|---|---|
| X | GB 2 291 014 A | (KANSEI) See Figs. 1, 5 and p. 9,ll. 5-20. Note snap connector 15b, c in uniform section airbag housing. | 1,2,11 |
| X | EP 0 792 773 A1 | (TAKATA) See Fig. 1. An elongate housing having snap connectors. | 1,11 |
| X | EP 0 722 862 A1 | (MORTON) See Fig. 1 Note snap connector 80, 82 in uniform section airbag housing. | 1,11 |
| X | US 5 669 627 | (MORTON) See Fig. 2. Note bead 12 and socket 14 closing extruded housing having tear seam 22. | 1-4,9-11 |
| X | US 5 520 410 | (TRW) See Fig. 1 A housing closed by a socket and bead fastener. | 1,4,11 |
| X | US 5 531 471 | (NISSAN) See Fig. 1 Note snap connector 37, 47 in uniform section airbag housing. | 1,11 |

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|---|---|---|---|
| X | Document indicating lack of novelty or inventive step | A | Document indicating technological background and/or state of the art. |
| Y | Document indicating lack of inventive step if combined with one or more other documents of same category. | P | Document published on or after the declared priority date but before the filing date of this invention. |
| & | Member of the same patent family | E | Patent document published on or after, but with priority date earlier than, the filing date of this application. |

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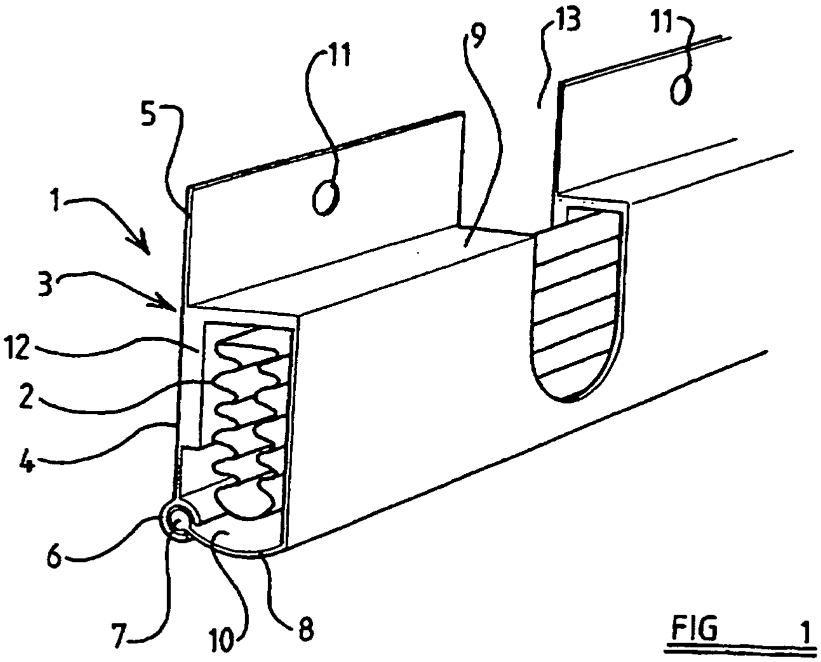

FIG 1

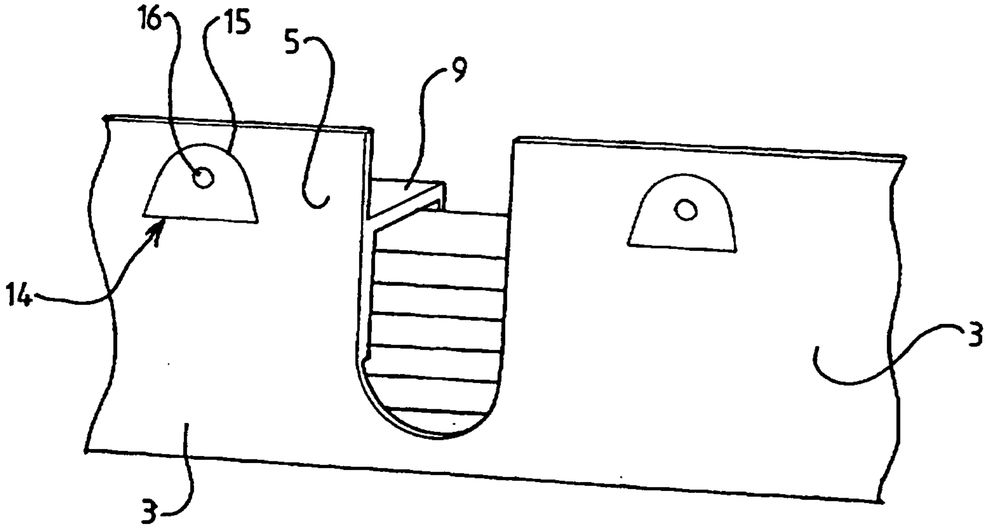

FIG 2

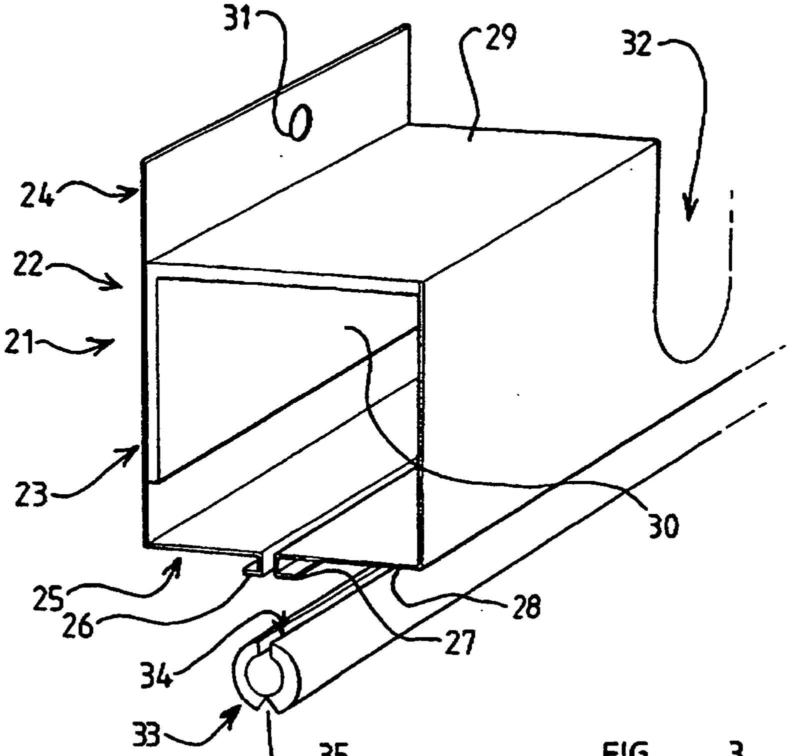

FIG 3

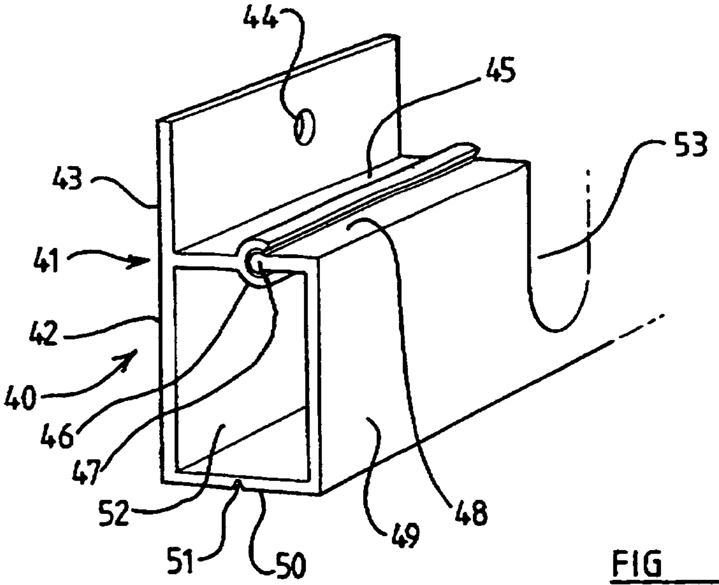

FIG 4